ABSTRACT

A rapid and reconfigurable deployment of services in a CATV system is enabled by the use of dynamic passive optical networks (DPONs) in accordance with the present invention. By delivering a number of wavelengths to the PON and using various dynamically reconfigurable groupings of the wavelengths to support differing subsets of users, the maximum capabilities of a static PON architecture are greatly exceeded. In accordance with one embodiment of the invention, the dynamic PON device accepts M wavelengths on a single optical fiber. The output of the dynamic PON device includes N output ports. Each of the M signals can be delivered to none, some or all of the N output ports. At its input, the DPON includes an optical amplifier for amplifying the multi-wavelength input signal to a desired power level prior to splitting. A 1:N channel power splitter couples to the output of the optical amplifier. Each of the power splitter outputs contains all M wavelength channels of the optical fiber. Each of the N outputs of the power splitter is fed into an optical demultiplexer unit where each of the M optical signals appears on a (single) output fiber of the demultiplexer. The output ports of the M x M cross-connects are coupled to N optical multiplexers. More specifically, the output ports of the cross-connect are connected by grouping the output ports into M/N groups. The first of those groups is connected to the first optical multiplexer, the second of the groups to the second of the optical multiplexers and so on. In this manner, each cross-connect will have connectivity to all of the multiplexers via the M/N ports connected to each of the N optical multiplexers. In networks not employing DWDM, each of the M incoming wavelengths to the DPON would be split N times by a power splitter. The optical demultiplexers are not utilized. The outputs of all of the power splitters are then connected to the cross-connect fabric and the multiplexers as previously described.